American Museum Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK 24, N.Y.

NUMBER 1950 JUNE 17, 1959

A New Middle Eocene Edentate from Wyoming

BY GEORGE GAYLORD SIMPSON

INTRODUCTION

In 1950, 1951, 1952, 1954, and 1957, parties principally from the University of Wyoming collected and made stratigraphic studies in the vicinity of Tabernacle Butte, at the northern end of the Green River Basin in western Wyoming. Parts of the field work and of the ensuing research were done in collaboration with the American Museum of Natural History. The main technical report has been published by McGrew (1959).

In 1950 Malcolm C. McKenna, University of California, worked for a time at Tabernacle Butte with a joint University of Wyoming-American Museum party. He later returned to the area and made further collections, parts of which he kindly presented to the American Museum in order to keep the more important study specimens less scattered. In 1956 he developed a quarry, Misery Quarry,[1] University of California locality V-5628. This is in the upper part of the Bridger formation, about 150 yards southeast around the hill from University of Wyoming locality 6 (as shown in McGrew, 1959, fig. 1) and at the same level. In addition to a sampling of the otherwise known fauna, mostly duplicating records from nearby locality 5, this quarry yielded a unique specimen of a new genus and species of edentates, the first member of the rare family Epoicotheriidae to be known from the

[1] In allusion to a virus infection from which the whole party suffered at this locality in 1950.

middle Eocene. The specimen was received too late for inclusion in the monograph by McGrew and others, and it is here separately described, with profound thanks to Mr. McKenna.

Figure 1 was drawn by Mr. Chester S. Tarka.

CLASSIFICATION

CLASS MAMMALIA LINNAEUS, 1758

ORDER EDENTATA CUVIER, 1798

SUBORDER PALAEANODONTA MATTHEW, 1918

FAMILY EPOICOTHERIIDAE SIMPSON, 1927

TETRAPASSALUS,[1] NEW GENUS

TYPE: *Tetrapassalus mckennai,* new species.

KNOWN DISTRIBUTION: Bridger formation, middle Eocene, Wyoming.

DIAGNOSIS: Lower canine followed in nearly closed series by four subequal, cylindrical, peg-like cheek teeth without closed roots or root division; no distinct shelf along alveolar or occlusal border of mandible.

Tetrapassalus mckennai,[2] new species

TYPE: A.M.N.H. No. 56030, most of the right lower jaw. Found and presented by M. C. McKenna.

HYPODIGM: Type only.

HORIZON AND LOCALITY: Bridger, middle Eocene, in the vicinity of Tabernacle Butte, Wyoming. University of California locality V-5628, Misery Quarry (see above).

DIAGNOSIS: Sole known species of the genus.

DESCRIPTION

The jaw indicates a very small mammal, probably nearly the size of *Xenocranium pileorivale* and little over half of the size of *Pentapassalus pearcei.* Indirect comparisons (in the absence of homologous parts) suggest that it was only slightly, perhaps not significantly, larger than the tiny *Epoicotherium unicum.*

The anterior tip is broken away, so that the shape of the symphysis and the possible presence of incisors cannot be determined. The first alveolus preserved is comparatively large, nearly circular, causing a buccal bulge of the bone of the mandible and with its buccal lip con-

[1] Greek τετρᾰ́ς, four, πᾰ́σσᾰλος, peg, with reference to the four peg-like lower cheek teeth and in suggestion of relationship to *Pentapassalus.* It is of no nomenclatural importance that the numerical prefix in *Pentapassalus* refers to upper and in *Tetrapassalus* to lower teeth.

[2] For Mr. Malcolm C. McKenna.

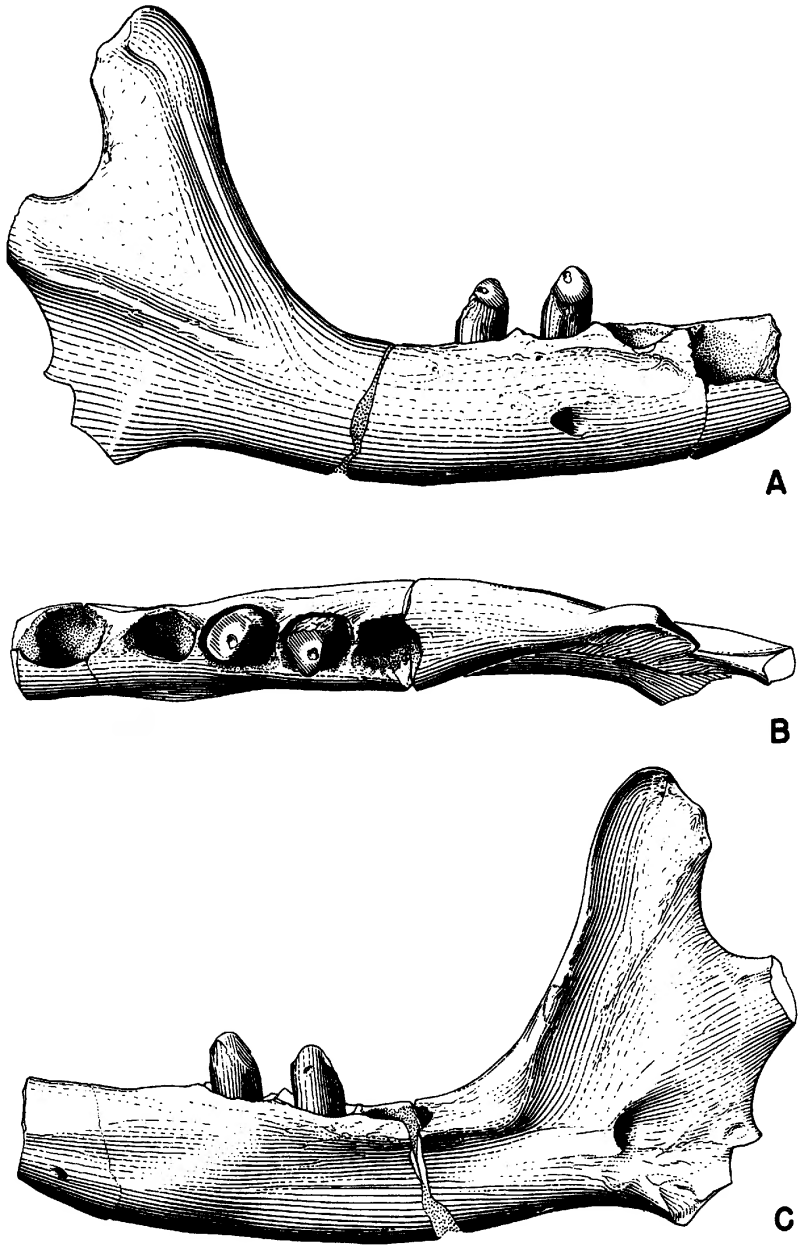

FIG. 1. *Tetrapassalus mckennai* Simpson. Type, A.M.N.H. No. 56030, incomplete right lower jaw. A. External view. B. Crown view. C. Internal view. All ×6.

siderably emarginate, or extending more ventrally than the lingual side. This alveolus clearly lodged a large and protruding tooth homologous with that present in all known palaeanodonts and generally considered a canine. Posterior to it are a short diastema and then a series of four alveoli, not closely appressed but without distinct diastemata. They are subequal in size, and all are subelliptical in horizontal section. They are undivided and without ridges that would correspond with grooves on the corresponding teeth. Their mouths present almost dorsally, somewhat buccally for the anterior and lingually for the posterior alveoli.

The first and fourth cheek teeth (as well as the canine) were lost before burial, but the second and third are preserved. The latter two teeth are closely similar, simple, peg-like cylinders. The cross sections

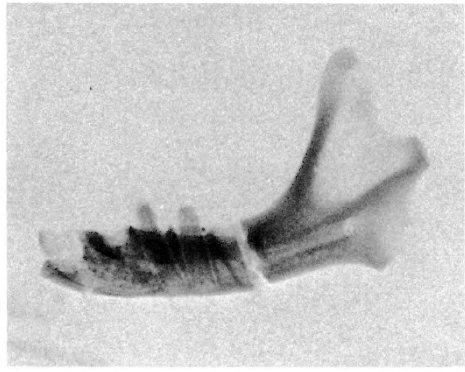

FIG. 2. *Tetrapassalus mckennai* Simpson. Type, A.M.N.H. No. 56030, incomplete right lower jaw. X-ray photograph (printed as positive). ×3.

are almost circular, except that the buccal face of the third cheek tooth is slightly flattened. Enamel is probably absent. The teeth are truncated by wear, each with a flat wear facet dipping steeply antero-bucco-ventrally. On each facet, in the mid-axis of the tooth, is a small, very shallow pit on lighter-colored or less translucent dentine.

Figure 2 reproduces one of eight X-ray photographs studied. The undivided, unclosed nature of the root, or absence of a true root, is shown unequivocally for the second and third cheek teeth and with high probability for the alveoli of the other two. On the second and third cheek teeth the pulp cavity is seen beginning as a point immediately below the mark on the wear facet mentioned above and expanding as a hollow cone to the ventral base of the tooth, where the cavity is wide open. The wall between the second and third cheek alveoli is

composed entirely of compact bone and narrows ventrally. That between the first and second alveoli, although less well preserved, was probably similar. The fourth alveolus, however, diverses posteroventrally from the third, and between the ventral parts of their compact bone appears a wedge (tapering dorsally) of cancellous bone or possibly a small sinus. (The course of the inferior dental canal and the thick bone of the postalveolar ridging, described below, are also well shown in the X-rays.)

The horizontal ramus is shallow, as in all palaeanodonts, with a gently rounded lower border. A single mental foramen is preserved below the second cheek tooth. The jaw is somewhat thickened (buccolingually) at and just posterior to the last cheek tooth, but there is no distinct shelf or hollow such as occurs prominently in Metacheiromyidae and feebly in some Epoicotheriidae. The high, slender, coronoid process rises from the alveolar border in a rounded curve and at an open angle, somewhat over 90 degrees, less abruptly and less vertically than in *Pentapassalus*. The external (temporal) fossa is triangular, well defined by an anterodorsal ridge along the buccal side of the anterior edge of the process and by a ventral ridge running to the condyle. The condyle is broken off but was clearly much elevated above the alveolar border, about as in *Pentapassalus* in which, however, the supporting buccal ridge was less marked. The angle, the tip of which is broken, was well defined and projected sharply posteroventrally, also about as in *Pentapassalus*. Its lower border was slightly inflected. The inferior dental foramen is only slightly anterior to a point beneath the dorsal tip of the coronoid process.

COMPARISONS AND AFFINITIES

Tetrapassalus is clearly an edentate, and in view of its general resemblances and early Cenozoic North American occurrence it can confidently be referred to the Palaeanodonta. The lower jaws and dentitions are not sharply diagnostic at family level between the Metacheiromyidae and Epoicotheriidae (although other parts, especially the skulls, are). However, the lower cheek teeth were reduced much more rapidly in the Metacheiromyidae, notably in *Metacheiromys* which is contemporaneous with *Tetrapassalus*. (On the Metacheiromyidae, see Matthew, 1918; Simpson, 1931.) In this and in the general outlines of the jaw *Tetrapassalus* is more like the Epoicotheriidae, and it may be referred to that family with sufficient probability, although not with complete certainty. It is, in any case, very sharply distinct from any known metacheiromyid.

The known, probable, previously named genera of Epoicotheriidae are:

Early Eocene:

Tubulodon Jepsen, 1932. Ascribed by Jepsen to the Tubulidentata, but shown by Gazin to be an edentate and probably an epoicotheriid.
Pentapassalus Gazin, 1952.

Early Oligocene:

Epoicotherium Simpson, 1927. (See also Douglass, 1905, under the preoccupied name *Xenotherium*.)

Middle or late Oligocene:

Xenocranium Colbert, 1942.

Tubulodon had at least five lower cheek teeth, at least three of which were two-rooted and essentially brachydont. The last was reduced, and the preceding three were markedly longer than wide. These differences from *Tetrapassalus* certainly exclude generic identity and perhaps any close relationship. (The cuspidate crowns of *Tubulodon* do not constitute a sure difference, as they would quickly be obliterated by such wear as has occurred in the type of *Tetrapassalus*.)

Pentapassalus had six lower cheek teeth, the first of which was smaller than the rest and the fourth of which was two-rooted. It also had a shelf posterolingual to the tooth row. Some other minor and more doubtful differences in jaw structure are noted above. Reduction in number of teeth and loss of the rooted condition in all of them would be in line with probable evolutionary trends. It is thus possible that the later *Tetrapassalus* is a fairly close relative, or even a descendant, of *Pentapassalus*, but the change is somewhat abrupt for the comparatively short time lapse. It is unlikely that *T. mckennai* was derived from the much larger *P. pearcei*. The available points of comparison are, in any case, too few to support a hypothesis of direct filiation, although some degree of intrafamilial relationship is likely.

The known specimens of *Epoicotherium* and *Tetrapassalus* include no homologous parts, and direct comparison is impossible. In all palaeanodonts in which the numbers are known (*Xenocranium*, 4/5; *Pentapassalus*, 5/6; *Metacheiromys*, 1/2; and *Palaeanodon*, probably 4/5) the number of upper cheek teeth is one fewer than the number of lower. *Tetrapassalus* therefore probably had three upper cheek teeth as against five in *Epoicotherium*, and *Epoicotherium* six lower as against four in *Tetrapassalus*. Even if the rule did not hold exactly for these genera, it is extremely unlikely that their dental formulas were the same. As the palaeanodont trend seems to have been for reduction

of cheek teeth, it is improbable that *Tetrapassalus* was ancestral to *Epoicotherium*. The difference in age is considerable, and discovery of comparable parts is more likely to increase than to decrease the diagnostic distinctions.

Xenocranium also had a larger number of lower cheek teeth (five) than *Tetrapassalus* and had a small but distinct posterolingual shelf extending the alveolar border, lacking in *Tetrapassalus*. The mental foramen is more posterior in the type of *X. pileorivale* (only known specimen of *Xenocranium*), and the contour of the lower border of the ramus is almost straight forward to beneath the first cheek tooth, where it turns upward abruptly, quite unlike the evenly rounded contour of the *Tetrapassalus* jaw.

The six specimens of epoicotheriids known to me represent five genera, no one probably ancestral to any other, although this is a bare possibility for *Pentapassalus-Tetrapassalus*. There may well be other specimens in undescribed collections, but there is little doubt that remains of these animals are rare and are extraordinarily varied in proportion to their numbers. Of the more common, but still hardly abundant, metacheiromyids I know 25 specimens, which may represent a single lineage (*Palaeanodon-Metacheiromys*) at the generic level.

It appears that these small edentates underwent considerable radiation in North America from the Paleocene through the Oligocene, essentially simultaneous with the basic radiation of edentates in South America. That the North American radiation was much smaller in scope, followed different lines, and ended in total extinction seems to have been a matter of ecological opportunities open in South America but preëmpted by other orders in North America.

The following measurements of the cheek teeth (numbered serially from anterior to posterior) are in tenths of millimeters and were taken to 0.05 mm. (i.e., one-half of 0.1 mm.)[1]:

	Alveoli				Diameter of Crowns Above Alveoli	
Tooth	1	2	3	4	2	3
Length/width	14/10	14½/10	15/10	13/10	10/9	10/9

The depth of the horizontal ramus on the lingual side below the alveolar rim of the third cheek tooth is 27½.

[1] This form of publishing the measurements avoids the false limits implied by, for instance, 1.45, when measurement is not in fact to 0.01 mm.

REFERENCES

COLBERT, EDWIN HARRIS

1942. An edentate from the Oligocene of Wyoming. Notulae Nat., no. 109, pp. 1–16.

DOUGLASS, EARL

1905. The Tertiary of Montana. Mem. Carnegie Mus., vol. 2, pp. 203–208.

GAZIN, C. LEWIS

1952. The lower Eocene Knight formation of western Wyoming and its mammalian faunas. Smithsonian Misc. Coll., vol. 117, no. 18, pp. i–vi, 1–82.

JEPSEN, GLENN L.

1932. *Tubulodon taylori*, a Wind River Eocene tubulidentate from Wyoming. Proc. Amer. Phil. Soc., vol. 71, pp. 255–274.

MATTHEW, WILLIAM DILLER

1918. A revision of the lower Eocene Wasatch and Wind River faunas. Edentata. Bull. Amer. Mus. Nat. Hist., vol. 38, pp. 620–657.

MCGREW, PAUL O.

1959. The geology and paleontology of the Elk Mountain and Tabernacle Butte area, Wyoming. Bull. Amer. Mus. Nat. Hist., vol. 117, pp. 117–176.

SIMPSON, GEORGE GAYLORD

1927. A North American Oligocene edentate. Ann. Carnegie Mus., vol. 17, pp. 283–296.

1931. *Metacheiromys* and the Edentata. Bull. Amer. Mus. Nat. Hist., vol. 59, pp. 295–381.